

Growing Sweet Sorghum and Making Sorghum Sirup

BY M. W. HENSEL



A FIELD OF NORTH CAROLINA SORGHUM
This crop grows well in all parts of the State

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BY M. W. HENSEL

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Sweet sorghum for sirup has not received the attention it merits from agriculturists, either from the standpoint of food value or as a money crop. The sirup is a wholesome article of diet in itself and may be used in many ways to reduce the sugar bill of the home. In cooking, in baking, or in the making of jelly, it adds a flavor that is more pleasing to many persons than that of the refined sugar.

The seed is an excellent feed for either poultry or stock, or by grinding into flour for human consumption. It has a food value equal to 10 per cent of corn and, commercially, it has about the same relative value as for food.

The stripped leaves, when properly cured, are good fodder, and the dried stalks may be used for silage, for dry feed, for fuel, for fertilizer, or for making paper. The skimmings from the juice in the manufacture of the sirup may be made into good vinegar.

The proper disposal of a crop of sweet sorghum will turn every particle of it into a food and money value that will equal that of almost any other field crop and be superior to many.

VARIETIES

Beginning with a single variety of Chinese sorghum in 1853, the number of varieties has increased by importations and by crossing until there are now considerably more than two hundred so-called varieties in the United States. There can be no doubt that many of the so-called varieties are merely local names for some of the older and generally known varieties. For this reason there is much confusion of ideas and names in any discussion of sorghum varieties.

Charles R. Ball of the U. S. Department of Agriculture divides the sweet sorghums into three or four groups, each consisting of a single, well-marked variety and a number of forms derived from it. These

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NOTE.—The writer does not claim originality for the ideas expressed in this circular. He has tried to give practical information on all topics under discussion, and has drawn freely on the best authorities available. He has not, however, stated as facts anything that has not been confirmed by his own experience or observation. All discussions herein refer to sorghum sirup purposes only. It is earnestly hoped that these few pages will be helpful to those engaged in growing sorghum for sirup, and that it may also induce others to give this the attention it merits.

groups are the Amber, Orange, Sumac, and Gooseneck Sorghums. It is certain that these groups, with possibly the addition of the Hone variety, include the general characteristics of all the known varieties of saccharine sorghums, and are so well known that their individual descriptions seem needless here. All of them are good for sirup purposes when true to type and when grown in a suitable climate and on a suitable soil.

CROSSING OF VARIETIES

It is a common belief among farmers that sorghums cross easily and readily; that it is difficult to keep a pure variety where several are grown near to each other, especially if one is of the non-saccharine character. Some good authorities, on the other hand, notably Collier, deny this and claim that different varieties may be grown side by side for years without any perceptible evidence of crossing. The writer believes that if this may be done it must be with varieties that bloom at different periods. In actual practice, many cases have been observed where a pure sirup variety, grown for several years by the side of a non-saccharine variety, becomes almost worthless for sirup purposes. In fact, during the last season (1918) in some localities in this State sirup makers complained that much of the sorghum brought to the mill was of little value because it was deficient either in quantity or quality of juice and *some was deficient in both quality and quantity. The sirup makers invariably attributed this poor quality of sorghum to crossing of varieties, either with the non-saccharine sorghums or with inferior varieties of the sweet sorghums through a series of years.* Careful investigations might prove the theory of the sirup makers to be wrong but would be more likely to prove it correct.

Careful observation has repeatedly shown that where two varieties are grown close to each other they will cross if the date of blooming coincides. If one blooms earlier than the other crossing is not likely to occur. In order to keep the seed of any variety pure it is always safe to plant at a distance from any other variety.

SELECTION OF VARIETIES

The principal points with reference to which varieties should be selected are suitability to soil, purity of seed, size of stalk, strength of stalk, quality of sirup, quantity of sirup, and climate.

It is the general belief among sorghum growers that some varieties are partial to certain kinds of soils. Just how far this partiality extends or what nature of soil each variety prefers, if any, is not well known. It certainly is true that the nature and color of the soil affect the quality, quantity, and color of the sirup. Dark and heavy soils will produce a darker sirup than the light and sandy soils. From some soils the juice is more difficult of clarification than from others and the sirup will

cloudy. Soils that are deficient in some chemical constituent, notably ash, will give a juice deficient in sugar (sucrose), hence less sirup. A series of variety tests are now being planned for different sections of the State by which it is hoped to determine more definitely what varieties are most suitable to the different soils, and whether any variety may be found the color of whose product is not affected by the color of soil.

In the selection of a variety the farmer should be sure that it is true type and that the seed is not crossed either with a non-saccharine rhum or with an inferior sirup-producing variety.

The early maturing kinds are usually small in size and give a light yield per acre. Practically all the late varieties have larger and heavier stalks and are more profitable in a region of long-growing seasons. For stiff and heavy soils, particularly where high winds are liable to occur, a variety that has a strong stalk should be selected to prevent loss by lodging.

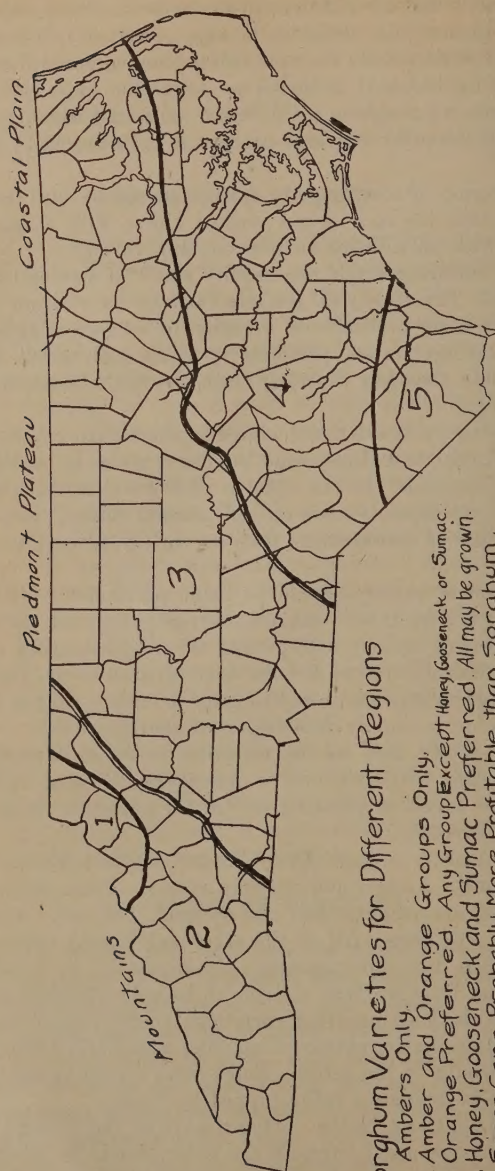
Some varieties yield a lighter colored product than others on average yields, as the Amber and Honey, and the flavor seems to be different with different varieties. In the opinion of the writer, both quality and quantity of sirup depends more on soil, season, tillage, time of harvesting, and methods of manufacture than on variety, although variety does play a part.

The selection of variety should be made particularly with reference to climate. It is a mistake to plant a short-maturing variety in a section where the growing season will permit the long-maturing varieties to ripen if the planting is done for the sake of profit from the sirup. It is an equally great mistake to try to grow a variety that is liable to be frost-bitten before maturity in a region of short seasons.

Frost data shows that in the counties of Ashe, Watauga, Avery, Mitchell, together with portions of Alleghany, Wilkes, and Caldwell, there is always a risk in planting any of the varieties except the black red Amber variety.

The black Ambers include Early Amber, Folgers Early, Minnesota Amber, Wisconsin Amber, and possibly others. These mature in from 80 to 100 days, according to soil and season. The red Amber matures from 80 to 110 days. All of the other well-known varieties require from 105 to 150 days for ripening. Consequently, in a region where the period from frost to frost is liable to be only 120 days or less it is a risk to plant the long-maturing varieties. In the rest of the mountain area of this State the above-named varieties and Early Orange, or some of its group, would be the safest. Some other varieties may ripen, but will always be in danger of being nipped by frost.

In the Piedmont and in the northern part of the Coastal Plain, the Amber or Orange groups, preferably the latter, should be planted. Goose-neck, Sumac, or Honey may be grown in safety in some years, but these years are uncertain. In the remainder of the Coastal Plain any variety



Sorghum Varieties for Different Regions

1. Ambers Only.
2. Amber and Orange Groups Only.
3. Orange Preferred. Any Group Except Honey, Gooseneck, or Sumac.
4. Honey, Gooseneck and Sumac Preferred. All may be grown.
5. Sugar Cane Probably More Profitable than Sorghum.

be grown, but the longer maturing varieties, such as the Honey, Roseneck, and Sumac groups should take preference. (See suggestive p, page 6, for varieties of sorghum to be planted, based on length of growing season.)

SOME VARIETIES UNDER EACH GROUP

Black Amber Group includes: }		<i>Days from Planting to Maturity</i>
Early Amber	}	70 to 100
Minnesota Amber		
Folgers Early		
Wisconsin Amber		
Black Amber		80 to 110
Orange Group		
Planters Friend	}	
McLean		
Silver		
Silver Drip		105 to 140
Silver Rind		
Straightnecked Ribbon Cane		
Sourless		
Orange		105 to 125
Orange (cross of Amber and Orange)		105 to 125
Sumac Group		
Liberian	}	
Red Liberian		
Redtop		105 to 150
African Redtop		
Roseneck Group (Texas Seeded Ribbon)		120 to 135
Honey (Japanese Seeded Ribbon)		130 to 140

Growers should remember that any variety may give a large yield that makes a good sirup one year, but under different weather conditions in another year may not do so well. Weather conditions exert a strong influence on all sugar-producing plants.

When a variety has yielded well in both quantity and quality of sirup seed should be carefully selected and preserved for future planting.

TIME OF PLANTING

Sorghum should not be planted until the ground is thoroughly warm. It may be planted at any time after that period until as late as will give sufficient time for the crop to ripen. In sections where the growing season is long and the fall weather liable to be dry, late planting is better, as the juice will be richer when the weather is cool and dry during the ripening time. In any condition the date of planting should

be so arranged, if possible, that germination and early growth of the plants will take place during the period of high temperatures, and the flowering and fruiting when moderate temperatures prevail.

If a large acreage is to be planted it is better to plant at different periods of from ten days to two weeks apart so that the whole crop will not mature at the same time.

METHODS OF PLANTING

It is now generally agreed that the best method is to plant in rows about three and one-half feet apart, with one plant every four to six inches, or in hills from twelve to fifteen inches apart, with three or four stalks in a hill. In very strong soils a heavier stand may be allowed as this has a tendency to prevent the suckering due to excessive richness of soil. The planting may be done either by hand or with a planter, but great care should be taken that the seed be covered not to exceed half inch. The seed should not be planted in furrows except in dry regions, nor on ridges except where the land is low and poorly drained.

RATE OF SEEDING

Two quarts of seed, if evenly distributed, will be enough for one acre. If all the seed were good it would then be necessary to thin out the crop. Since it is nearly impossible to secure an equal distribution of so small an amount of seed it is better to plant from three to four quarts to the acre with the expectation of thinning. It is better to thin than to replant, for in the latter case the crop would not all ripen at the same time.

SOILS

Sorghum will do well on any fairly rich, well-drained land, but sand loams or clay loams usually give largest yields. As a rule, any soil that will produce a good crop of corn will give a good yield of sorghum, but soils that are inclined to bake should be avoided.

The prevalent idea that sorghum impoverishes the soil is not justified. With its many fibrous roots it feeds quite heavily on the plant-food in the surface soils, and so should not be followed by fall crops. If the land is plowed in the fall and put in good condition the following spring crop will not be noticeably less because of the sorghum that preceded it. Many instances are on record of sorghum being grown on the same tract year after year for as many as sixteen years, even without fertilizer, and the last crop would be as good as the first. The writer knows personally of a number of such cases. This, however, is not a good practice and the intelligent farmer will give sorghum a place in a regular rotation of crops.

FERTILIZERS

Well-rotted barnyard manure is perhaps the best fertilizer that may be used for sorghum. The principal plant-food constituents needed are

tash, phosphoric acid, and nitrogen. The amount of each of these to be used will depend, of course, upon the soil, but the amount will generally be, on any soil, about the same as is needed to produce a good crop of corn.

PREPARATION OF LAND

The land should be plowed some weeks before planting, preferably in the fall. The seed-bed should be thoroughly and deeply prepared, the soil being well pulverized. The land should be well harrowed just before planting, in order to kill all weeds, before the sorghum begins its growth. If the soil conditions are not good the growth of the crop will be hampered. If weeds are allowed to grow they absorb the necessary moisture and plant-food which should go to develop the sorghum.

CULTIVATION

In order to guard against the growth of weeds it is well to drag the land lengthwise of the rows several days after planting. Cultivation should begin as soon as the plants appear and should be frequent and thorough, but shallow. The feeding roots of the sorghum plant are near the surface of the soil and are liable to be injured by deep cultivation. In its early period sorghum develops a strong root growth, as compared with its top, and for this reason cultivation should be more careful and thorough until the plants are several feet high than in the later stage of their growth. The plants should be thinned when about six inches high to the desired number. The crop should be kept free from grass and weeds during the whole period of its growth. The surface of the soil should be kept loose by stirring as soon after each rain as the ground is sufficiently dry. The loose surface soil acts as a mulch to retain moisture and the stirring after rains kills the growing weeds and grass before they have time to do damage. Shallow cultivation may be profitably continued until the plants begin to head, provided always that care is taken not to injure the surface feeding roots. Careful and thorough cultivation will produce a stronger stalk, a heavier tonnage, and a greater and better quality of sirup.

HARVESTING

For sirup purposes sorghum should be harvested when the seed is in the late dough stage, just before it hardens. At this period the plant contains the highest sugar content and the juice is in the best condition to make a sirup of good flavor. If cut earlier, the cane is too green and the sirup will have an unripe taste. If cut after the seeds have become hard, the quantity of juice is liable to be less, the juice is hard to clarify, and the flavor of the sirup will not be so good.

If the blades are to be removed it may be done more thoroughly and easily before the crop is cut. A good method for doing this is to strike off the blades of the standing cane with a sort of wooden sword or flat

stick about three feet long. In case the stripping is not done until after cutting many of the blades may be removed by raking lengthwise of a pile of sorghum with a strong-toothed rake.

Harvesting may be done either by hand or with a corn harvester. For small crops it is usually done by hand, *but with any method the cane should be cut as close the ground as possible, as the lower part of the stalk is rich in juice.* When the cutting is done by hand the stalks should be laid across the row with seed tops all in the same direction. They can then be gathered into bundles and the seed tops removed and put away for curing. With a corn harvester the seed heads are always at one end of the bundle in good position for topping. The topping may be done rapidly by laying the heads on a block after the bundles have been gathered in piles and striking them off with a heavy, sharp instrument, as a carpenter's broad-axe or heavy corn knife. In removing the seed heads from twelve to eighteen inches of the upper stalk should be cut off as this part contains little sugar and many impurities. For the same reason any unripe stalks or immature suckers should be discarded.

It is best to work up the crop as quickly as possible after it has been cut, but it may be safely kept for many days, even weeks, without much loss in either quality or quantity of juice if the canes are tied in bundles of forty to fifty stalks each and the bundles set on butt ends, closely together, under shelter; or they may be laid, horizontally, in compact piles, and in either case shielded from sun and rain.

Frosting or freezing does not injure sorghum for sirup if it is worked up as soon as it thaws. In frozen sorghum the juice ferments in the stalk very quickly after thawing, rendering it unfit for sirup. The sorghum grower who harvests his crop at the right stage of development will receive better returns in both quality and quantity of sirup than the one who neglects to do so.

STRIPPED OR UNSTRIPPED STALKS

Experiments show that the amount of sirup from stripped and unstripped stalks of equal quality does not vary much, but the juice from the unstripped cane is more difficult to clarify and may impart a bad flavor to the juice and resulting sirup. Crushing when the blades are dry occasions more or less loss by the absorption of the juice by the dry blades during the process of milling.

While the above seems to be the conclusions of many experiments and of many sirup makers, there are many contradictory experiments and conclusions.

In the fall of 1918, the writer made the following observations at two of the largest and most modern sirup mills in North Carolina, situated in widely separated regions:

At one mill the sorghum was brought from the field as fast as it could be cut and topped, without stripping, and was milled before the blades

ould wilt. In this case the juice clarified without difficulty and the
ulting sirup had an excellent flavor. At the other mill the sorghum
s cut unstripped and allowed to lie until the blades were perfectly
r before milling. The juice was difficult of clarification—in fact, did
clarify perfectly—and the sirup had a cloudy look and poor flavor.
If it were safe to draw definite conclusions from only two observations
experiments, it might be said that by crushing unstripped cane while
blades are green the results will be as good as from stripped cane.
t there are so many other things that could affect results that such a
clusion would be unsafe. It is possible that with modern equipment,
h as filters and settling tanks for the juice, and rapid evaporation, as
d a product may be made from unstripped sorghum as from stripped
it is milled while the blades are green. However, it is much safer to
ip the cane where it must be worked up on the old-time mills with
filters or settling tanks, in order to be sure of a first-class sirup.

CURING AND THRESHING SEED

The seed is a valuable part of the sorghum crop. The yield per acre
ries with the variety of sorghum and with the stand, but an average
the sugar sorghums is about ten bushels to the acre.

For planting purposes, select only well-formed heads produced on
ical, well-developed stalks. Gather the heads when the seed is in the
m, dough stage, or when it is entirely ripe. If the seed is gathered
the dough stage, the proper condition for harvesting for sirup, it will
minate if properly cured, but there is greater danger of the heads
ating or molding. The seed heads should be placed loosely on open
eks or shelves in a dry place or in any dry place where the air will
eulate freely through them. The seed must be given a chance to dry
roughly without heating or molding. The seed may be threshed with
ommon grain separator, but to prevent cracking the seeds, a part, or
, of the concaves should be removed and the speed of the cylinder
luced to about 600 revolutions per minute. Thresh small lots of seed
drawing the heads over a block of wood into which nails have been
iven close enough together to catch the seed, or put the heads in a bag
d hammer with a stick. The seed may be cleaned by running through
fanning mill or other seed cleaner. Sack and store the seed in a dry
ace where it will not freeze and where it will be protected against
ice and weevil.

EQUIPMENT FOR MAKING SIRUP

The necessary equipment for making sorghum sirup is as follows:
ill for grinding or crushing; galvanized iron or copper evaporating
n; furnace, either brick or iron, upon which to place pan; settling
nk of 50 gallons and upward, according to capacity of mill; two open
-gallon barrels for receiving juice, these to be covered with a strainer

of wire gauze or burlap; 25 to 50-gallon open tub or barrel with spigot to be placed above pan for juice supply to pan; receiving tank or pan for sirup; several buckets and dippers; skimmers.

In addition to this equipment it would be well to have some kind of filter to cleanse the juice before entering the settling tank. A three-roller mill, with horse or other power, properly set up, with rolls adjusted correctly, and evenly fed, should extract at least 50 per cent of the weight of the cane as juice. A large mill will often do better than this. A two-roller mill will not extract much more than half as much, and should never be used.

From the mill the juice should pass through a filter into a settling tank. If no filter is provided the juice should be well strained through a wire screen or through clean burlap. Straining and settling are important to keep pulp and impurities from reaching the evaporating pan. If no settling tank is provided it is doubly important that the juice be well strained and filtered.

A good cheap filter may be made as follows: Make a wooden box from four to six feet long, sixteen inches wide and sixteen inches deep. Bore a hole in one end near the top. Fill the box with clean, tight-packed straw. Allow the juice from the mill to enter the box at one end and pass out the hole in the other end. Many impurities are deposited and held by the straw as the juice percolates through it. The juice comes out pure and consequently requires less skimming and makes a better sirup. The box must be cleaned with water twice a day. To do this easily it is well to have a hole in the bottom fitted with a tight plug. The straw should be run through the mill to press out the juice, and new straw put in the box. The sediment in the bottom may be strained and the juice used for sirup, or it all may be used as a stock feed.

The patent evaporating pans are generally superior to the home-made kind. They are arranged for shallow boiling and quick concentration with much less danger of scorching than with a "box." Some have a self-skimming arrangement which saves much labor. Steam evaporators are preferable where the operation is on a large scale, as the danger of scorching or burning the liquid is much less than with direct heat, but these would not be profitable for the small mill. They require from 8 to 40 horsepower steam boilers.

A complete outfit for making sirup with a capacity of 25 to 35 gallons a day can be purchased at the present time for from \$75.00 to \$115.00 according to material. Larger outfits will cost in proportion, but one with a capacity of from 65 to 100 gallons of sirup a day will cost from 140.00 to \$215.00. Purchasers should always keep in mind that with sirup plants, as with other things, the best is the cheapest in the end also, that a plant of large capacity will use but little more fuel or labor than a small one.

MAKING SORGHUM SIRUP

To make good sirup proper equipment must be provided and care and skill exercised in its use. The crop must be harvested at the right time and delivered to the mill in good condition, where it should be processed without unnecessary delay. Such defects in the product as greenish, muddy, or tarry black color; raw, acid, bitter, or scorched taste; suspended matter floating; stringy or fermenting, are all the result of carelessness and neglect. *Sorghum sirup, properly made and stored where the temperature remains moderate and even, will keep for many years without any change of quality.*

The mill should never be more than several hours ahead of the evaporator and no more juice should be extracted on any day than may be consumed on the same day. Raw juice, untreated by lime or chemicals, will ferment in a short time and become unfit for sirup, particularly in warm weather. Careful filtering and straining of the juice is necessary to produce a clear and well-flavored sirup. Methods for doing this have been given under another head. There are a number of chemical methods of purifying and clarifying juice, but all of these are open to objection that in the hands of the inexperienced unsatisfactory results may follow. As a rule, it is better that with a small mill chemicals should not be employed. Straining, filtering, and settling the juice before it reaches the evaporator, and thorough skimming during the process of evaporation are usually sufficient purifying methods.

The juice may be made clearer by heating in a settling tank to the boiling point and then allowing it to stand several hours after the heat is turned off. Albuminous matter coagulates by heating. Part of this rises to the surface and can be skimmed off. Part settles and is separated by drawing off the juice above the sediment. Where the heating process is used, an extra tank should be provided. The sediment and skimmings should not be wasted, but should be used for stock feed.

For such as may wish to use it, we give the following from an Experiment Station circular:

Clearing and Neutralizing Juice with Precipitated Chalk or Whiting. If the juice is very sour and does not settle well after heating, it may be improved by adding precipitated chalk or a good grade of whiting (carbonate of lime), in small amounts, to the boiling juice until the juice will no longer turn a piece of blue litmus paper red. The amount added will be about one-half to one ounce of whiting per gallon. Only the best whiting should be used. An excess will do no harm. The clarified juice is allowed to settle several hours after heating before drawing it off from the sediment for concentration. It is usually not necessary or advisable to use whiting or chalk for small-scale operations."

In the evaporating pan as thin a layer of juice as is possible, not over one and one-half to two inches deep should be carried. A thin layer allows quick evaporation and less color is developed when concentrating

to a sirup. Deep boiling in a pan will have the same effect as in a kettle—a dark, bad-tasting sirup. The importance of skimming is here emphasized. This should be thoroughly and constantly done from the time the first scum forms until the liquid has reached the sirup, or finishing point. There is no better method of cleansing than this. The skimmings are a good feed for hogs, if chemicals have not been used, but can must be used in first feeding. The skimmings will also make an excellent vinegar when allowed to ferment.

To determine the finishing point is one of the most important things for the sirup maker to learn. Most makers determine this by pouring the sirup from a spoon and watching the last drops fall. If these separate from the edge of the spoon in broad thin sheets the sirup is ready to be drawn off. Some makers judge the finishing point by the action and color of the boiling liquid, but this method is not always advisable. The only infallible methods of determination are the use of the thermometer or the Baume hydrometer. At sea-level finished sirup will boil at, roughly speaking, 224 degrees (Fahr.), while for every 500 feet above sea-level the boiling point is lowered one degree. At 2,000 feet above sea-level this point would be at 220 degrees and at 3,000 feet 218 degrees. In using the thermometer, it must not be allowed to touch the sides or bottom of the pan.

To describe the hydrometer here would take too much space, but for a finished sirup the reading on this instrument should be 38 degrees and over at a temperature of 60 degrees Fahr. A finished sirup will weigh not less than eleven and one-quarter pounds to the gallon, or twelve pounds including the tin container.

The finished sirup should be quickly drawn from the fire and rapidly cooled. If careful straining, settling and skimming of the juice and boiling liquid has been practiced, the product will not need filtering.

Sirup should be put in its containers while hot. If it is intended for market purposes a convenient form of container is a quart, two-quart or gallon tin can with screw top. Quart bottles or stone or glass jugs or jars may also be used. If for home use wooden pails or barrels can be used. Whatever the container, it should be thoroughly sterilized with hot water or steam shortly before filling. Sirup will not ferment if packed while hot in containers that have been sterilized with scalding water or steam and sealed immediately. The containers must be perfectly air-tight or the sterile sirups may become inoculated with the micro-organisms that produce fermentation.

To prevent breakage of glass or stone containers, they should be gradually heated to a degree near that of the sirup before filling. After the hot sirup has been placed in them they should be corked or sealed. The

NOTE.—For more detailed description of both equipment and methods of manufacture the reader is referred to Farmer's Bulletin No. 477, United States Department of Agriculture which may be obtained free on request to Division of Publications, United States Department of Agriculture, Washington, D. C.

tainer should then be turned upside down so as to bring the hot sirup in contact with the cork or top. This acts as a sealing wax and the sirup will keep indefinitely.

INDIVIDUAL MILL vs. COMMUNITY MILLS.

In some sections of North Carolina sorghum sirup is made on the farm by the farmer himself with a small outfit which he owns or rents. In other sections it is mostly made by parties who travel about with a portable outfit and make the sirup for a share or for a stated price per gallon. In neither of the above-mentioned cases can the results be satisfactory, either economically or in quality of product. The mills are in most cases too small to extract a high percentage of juice and there is consequent loss. There is seldom any equipment for straining, filtering, settling the juice and the resulting sirup will generally have an unfavorable flavor.

In contrast to these are the large well-equipped outfits with a capacity from 100 to 300 or more gallons of sirup a day that are located in some communities. These are owned either by a local company or by an individual. Every facility is provided for thorough extraction, for straining and settling the juice and for making the sirup—all under sanitary conditions. It is usually operated by a skilled sirup maker and the outfit is first-class. In some localities farmers haul their sorghum from eight to ten miles to such mills and feel well repaid in the better product that they receive.

The best of these large mills furnish all equipment, fuel, and labor and charge either a share of each customer's product or a stated sum per gallon. Usually the farmer is allowed to decide on cash payment or a share. A share of one-third or a cash payment of 30 cents per gallon is the basis on which most mills operate, but some charge more than this and others a little less. Thirty cents per gallon, or one-third the product, seems fair to both farmer and mill.

With a large mill in a community the farmer harvests his sorghum, hauls it to the mill, and takes his sirup home. He has saved much time and labor and has a product that is both palatable and marketable. The writer ventures the hope that many such mills will be in operation in this State soon. Wherever they are located the sorghum crop receives more careful attention.

BAGASSE

The bagasse, or crushed stalks, may be utilized in different ways. It is sometimes used as a fuel for the furnace of the evaporator, or for the boilers if power is produced by steam. It is of considerable value as a fertilizer, and when spread over fields and plowed under restores a part of the fertilizing ingredients taken from the soil by the plant. It is sometimes spread over fields and cattle given access to it. Mixed with vary-

ing percentages of cottonseed meal, molasses, etc., it has also been used as a dry dairy feed.

One of the most progressive sorghum growers of this State, who also operates a large sirup mill, utilizes it for silage. His mill is located near a large silo. After each half day's run of the sorghum mill he passes the bagasse through a silage cutter and into his silo. This farmer states that he has followed this practice for several years and finds his stock relish the silage and do well on it. This seems to be a very practical way of disposal.

Some Companies from Whom Sorghum Sirup Equipment May be Obtained

1. Chattanooga Plow Company, Chattanooga, Tenn. *General equipment.*
2. Golden's Foundry and Machine Company, Columbus, Ga. *Mills, open-pan evaporators, furnaces, and steam evaporators.*
3. Southern Plow Company, Columbus, Ga. *General equipment.*
4. Cook Cane Mill and Evaporator Company, St. Louis, Mo. *Mills, open-pan evaporators and furnaces.*
5. A. C. S. Bell Company, Hillsboro, O. *General equipment.*
6. Champion Evaporator Company, Hudson, O. *Evaporators and furnaces.*
7. Blymer Iron Works, Cincinnati, O. *Mills, open-pan evaporators and furnaces.*
8. The Bahman Iron Works Company, Cincinnati, O. *Mills, open-pan evaporators and furnaces.*
9. Sears, Roebuck & Co., Chicago, Ill. *Mills, open-pan evaporators, and furnaces.*
10. Montgomery-Ward Company, Chicago, Ill. *Mills, pan evaporators, and furnaces.*
11. The Spotless Company, Richmond, Va.

Some Companies from Whom Sirup Hydrometers, Cylinders and Thermometers May be Obtained

Eimer & Amend, New York City.

Champion Evaporator Company, Hudson, O.